Brig. Hist. Topogra. vol 10

THE

COMMERCIAL AQUEDUCT,

A PLAN FOR IMPROVING

THE PORT OF LONDON;

WITH A DESCRIPTIVE ENGRAVING,

AND SOME REMARKS ON THE

PANERGICON,

A CHYMICAL POWER,

CAPABLE OF BEING USED TO GREAT MECHANICAL ADVANTAGE IN CARRYING THIS PLAN INTO EFFECT, AS WELL AS THOSE WHICH RELATE TO THE INTENDED

DOCKS IN THE ISLE OF DOGS

AND

GRAVESEND TUNNEL,

AND ALSO

CAPABLE OF MATERIALLY MELIORATING THE SLAVE TRADE.

JUBEREM MACTE VIRTUTE ESSE.

LIV. ii. 12.

By JOHN DUMBELL, A.M.

LONDON:

PRINTED FOR THE AUTHOR,

And published by Richardson, Royal Exchange; and Debrett, Piccadilly.

1799.

Plan, Elevation and Sections of a Design for a COMMER

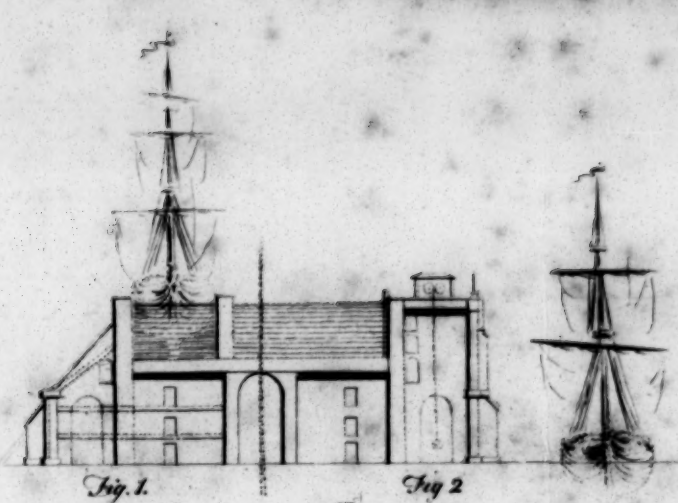


Fig. 1.

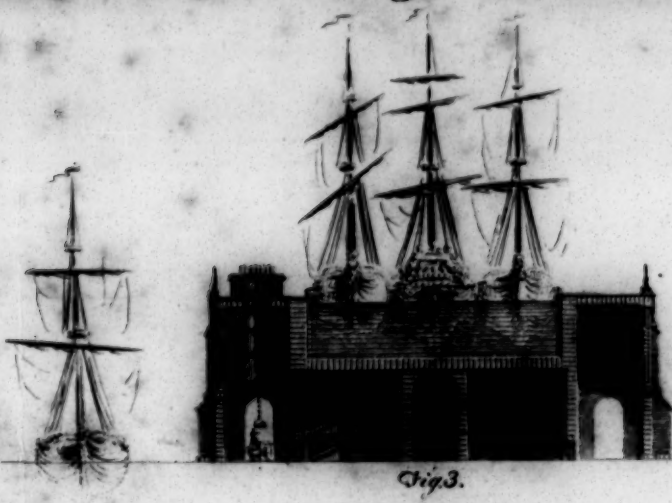


Fig 2

Fig. 3.

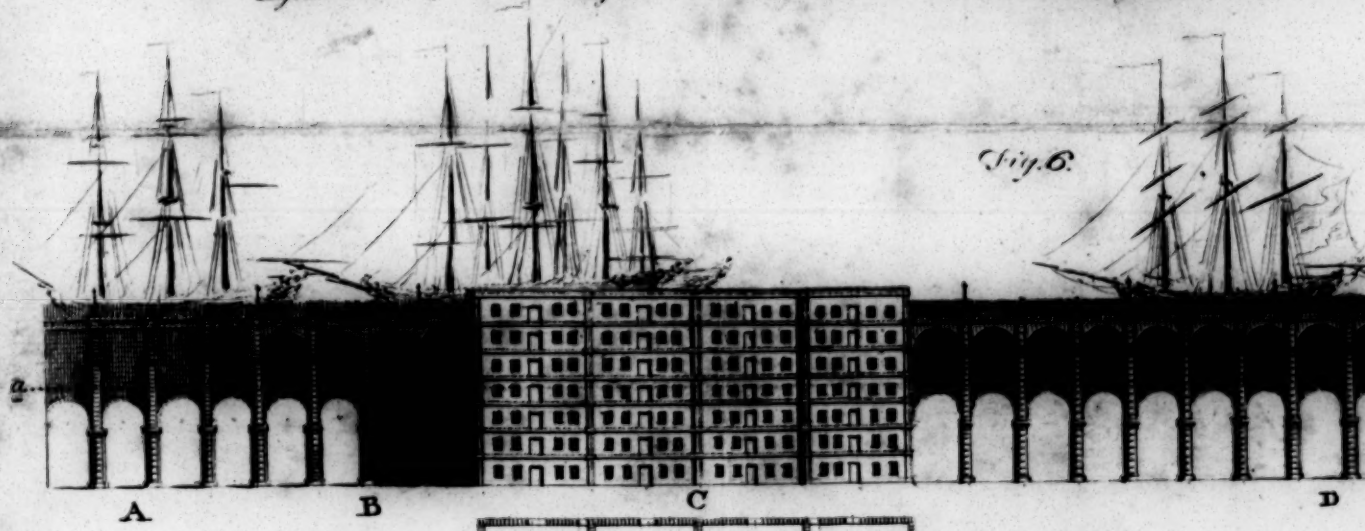


Fig. 6.

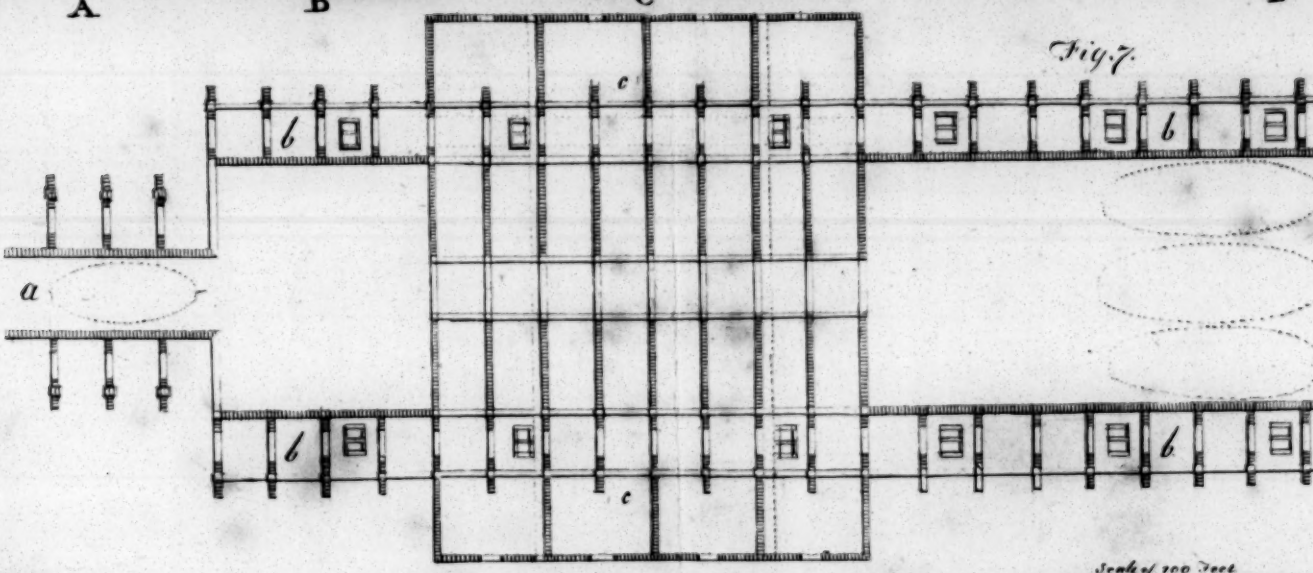


Fig. 7.

Scale of 100 Feet

A. The River Thames.
The shaded Lines from B to C describe the Course of the COMMERCIAL AQUEDUCT
D and E, Two Branches to open into the River above London Bridge and Black-Friars Bridge, as the Western Extremity of the Aqueduct does above Westminster Bridge.

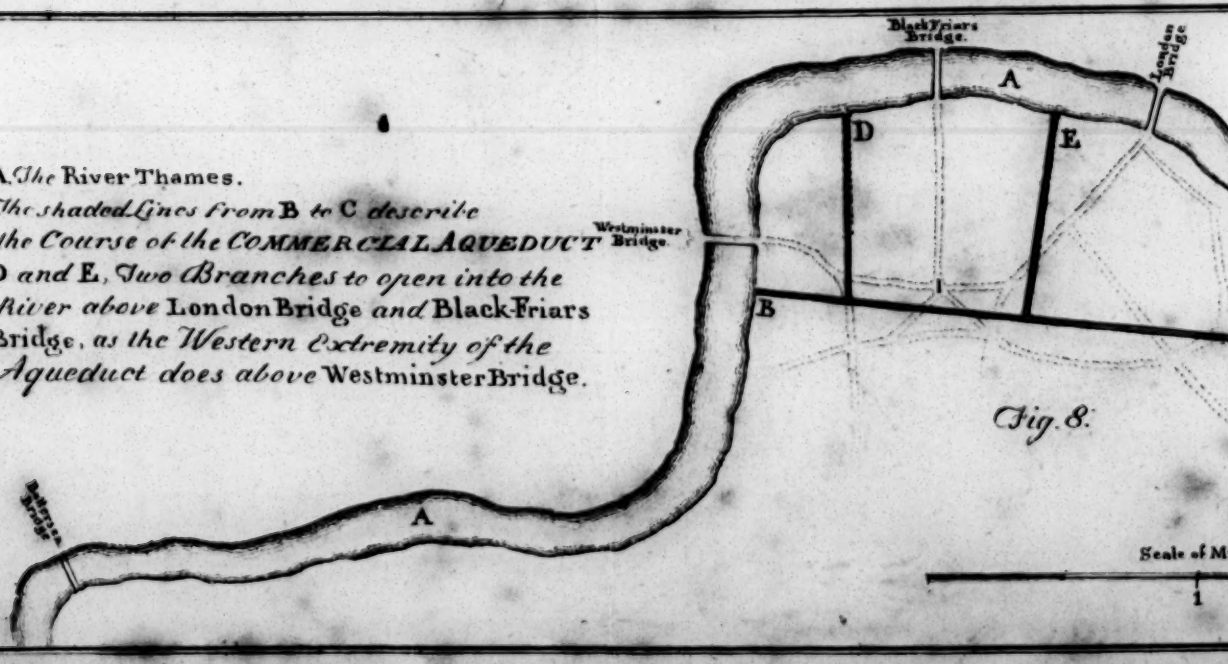


Fig. 8.

Scale of M
1

a COMMERCIAL AQUEDUCT.

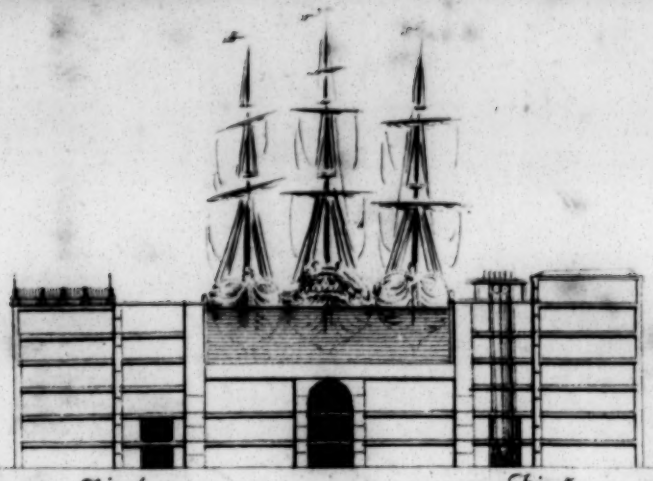
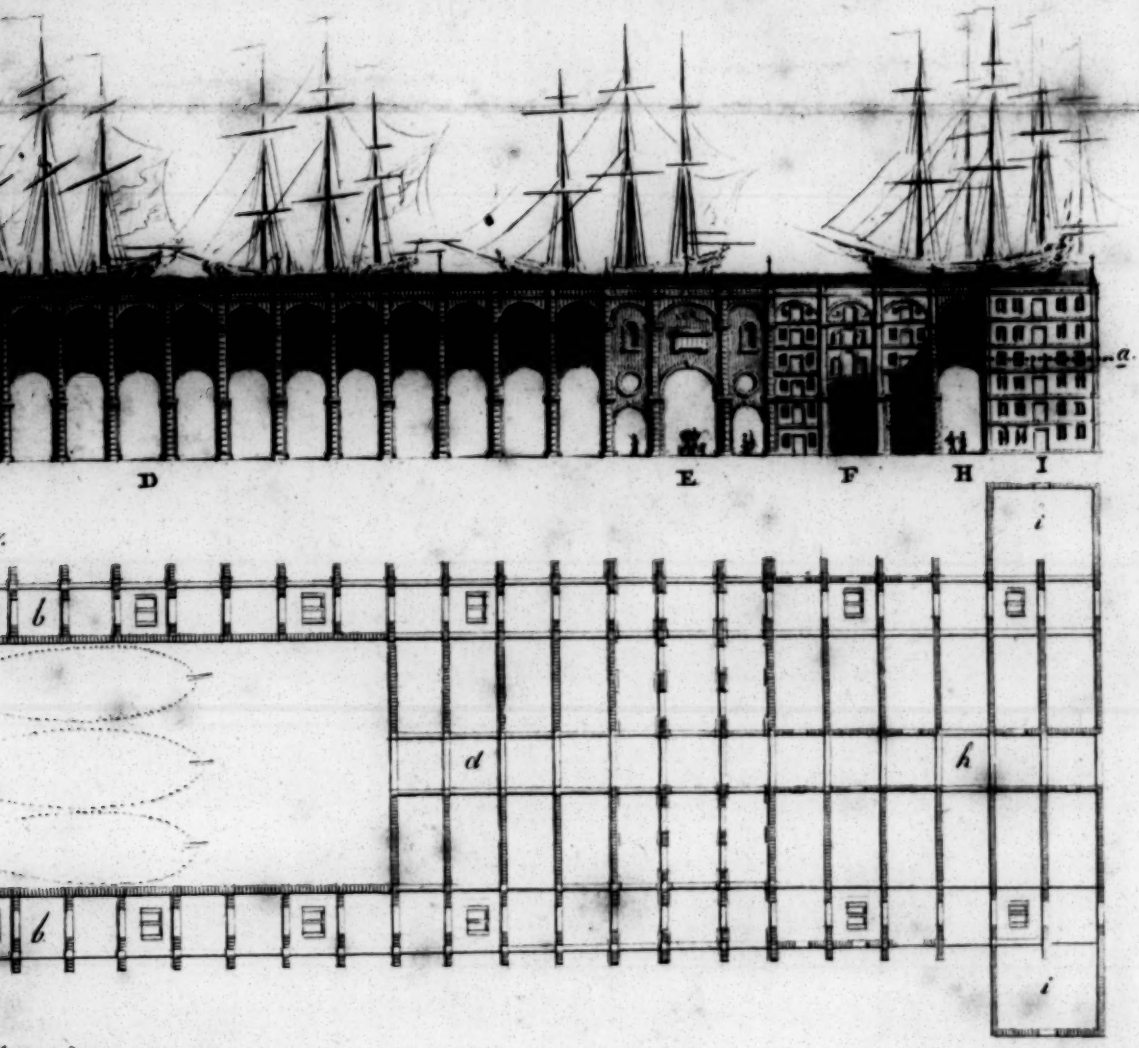
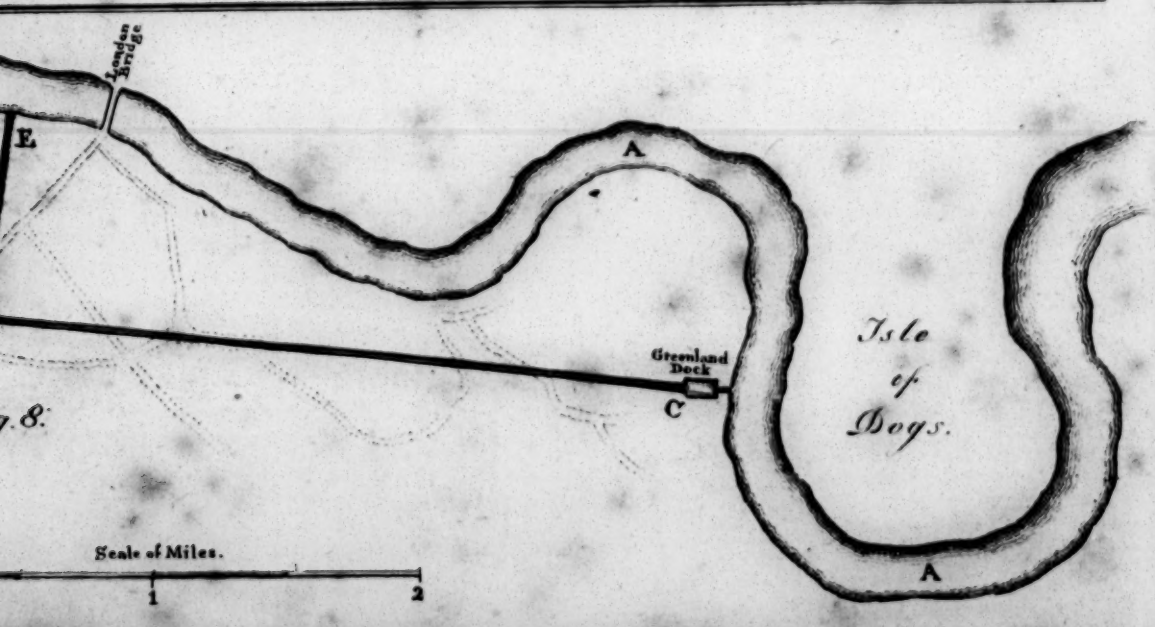


Fig 4. Fig 5.





7. 8.

DESCRIPTION OF THE PLATE.

FIG. 1, 2, 3, 4, and 5, contain sections of the Commercial Aqueduct.

FIG. 6. Is an elevation exhibiting the variations of design in different situations.

FIG. 7. Is a ground plan; and

FIG. 8. A map descriptive of the ground it is proposed to be erected upon.

FIGURES 1 and 2. From the left-hand side to the centre, give the idea how the Aqueduct may be constructed in such parts where expence may be wished to be spared, and where the width of one vessel may be deemed sufficient; (A in the elevation and *a* in the ground Plan correspond with this narrow part) the plan in this state would contain no contemptible warehouses, but they might be extended by raising the butments to the level of the Aqueduct, as represented in the other part of this Figure, (viz. from the centre to the right-hand side) where the butments so raised form a *quay*, level with the surface of the vessels, and bounded on its outside by iron palisades; (B. and D. in the elevation and *b. b.* in the ground Plan correspond with this part of the Figure.)

FIGURE 3. On the left side, shews the tunnels down which the merchandize may be lowered into the warehouses, or into carts stationed in the gateways at the bottom of the tunnel, with the staircases, &c. and the right side shews offices, passages, &c. &c. (F. in the elevation, and *d.* in the ground Plan, correspond with this Figure.)

FIGURES 4 and 5. Shew on the left-hand a still further extension of warehouses on the *sides* of the Aqueduct, terminating with a quay level with the surface of the water, having iron palisades on the outside, and admitting six tier of warehouses under the quay—(I. in the elevation, and *i. i.* in the ground Plan correspond therewith). The right-hand side shews the same warehouses extended one story higher, which would form a covered quay. (C. in the elevation, and *c. c.* in the ground Plan answer with this part of the Figure). The value of a covered quay in this climate, under which the merchandize may be placed the moment it comes out of the ship, is a matter perhaps peculiarly worthy of contemplation, and it would be a means of preserving dry the passages and the tunnels down which the goods are to be lowered.

FIGURE 6. E. is a design for one of the gateways where the Aqueduct is intersected by streets, roads, &c. and H. a less spacious thoroughfare, to be left wherever convenient.

It is stated that the Aqueduct with its locks may be supplied with water by the river Thames; and, from a survey made by Mr. BRINDLEY, in the year 1770, it appears that the river Thames falls on an average, 1 ft. 10 in. per mile. From Boulter's Lock to Mortlake, a distance of 41 m. 1 fur. 8 p. 45 ch. Its fall is 75 ft. 7 in.

N.B. A considerable part of the expence might be spared by commencing this Aqueduct nearer London Bridge than Greenland Dock; or in those parts which are too remote from the metropolis to be cultivated for warehouses, it might be constructed merely of raised earth. Had, for instance, the very valuable and extensive warehouses belonging to the East India Company been erected on this scite, and on a similar plan, what a great advantage would that respectable body have annually derived, in dispatch, in safety from fire and depredation, and in saving of labour.

☞ The unavoidable minuteness of the scale on which the several parts are drawn, is extremely unfavorable to the display of the design, but the Author is not less desirous on that account of declaring his obligations for the arrangement, perspicuity, and execution of these representations, to Mr. BONNOR, whose superior merits as an artist, are so strongly exemplified in his elegant COPPER-PLATE PERSPECTIVE ITINERARY, published at No. 181, in the Strand.

A

PLAN

FOR IMPROVING THE PORT OF LONDON,

BY MEANS OF

A COMMERCIAL AQUEDUCT,

WHEREBY A NEW COMMUNICATION FOR SHIPS OF ANY BURTHEN WOULD BE OPENED WITH THOSE PARTS OF THE RIVER THAMES WHICH ARE ABOVE LONDON, BLACKFRIARS, AND WESTMINSTER BRIDGES;

INCLUDING A DESCRIPTION OF THE

PANERGICON;

A POWER, WHICH TO MECHANICAL USES GENERALLY, BUT IN PARTICULAR TO WORKS OF SUCH A MAGNITUDE AS THE ABOVE PLAN, PROMISES ADVANTAGES OF THE GREATEST IMPORTANCE;

AS ALSO IN THE EVENT OF AN APPREHENDED CONSEQUENCE THAT IS EXPECTED TO ATTEND THE EXCAVATION OF THE

ISLE OF DOGS, FOR THE INTENDED DOCKS THERE;

AND LIKEWISE AS A REMEDY FOR SIMILAR IMPEDIMENTS TO THE COMPLETION OF THE

TUNNEL UNDER THE RIVER AT GRAVESEND;

TOGETHER WITH IMPORTANT ADVANTAGES TO THE

WEST-INDIA PLANTATIONS;

BEING AN EFFECTUAL SUBSTITUTE FOR THE LABOUR OF MEN AND HORSES, AND EQUAL TO ALMOST ANY EFFECT WHICH MECHANISM OR LABOUR CAN PRODUCE.

DEDICATION.

TO THE MOST NOBLE

FRANCIS,

DUKE OF BRIDGEWATER.

My Lord Duke,

The great discernment so clearly manifested in all your Grace's undertakings, will either at once evince my presumption in offering the following sheets to your notice, or encourage my perseverance; but whatever merits the Plan may have, which they are meant to elucidate, justice demands me to own, that

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they result from being familiar with the great works which you have perfected.

It is your Grace who has practically taught the natives of this land, what in theory was deemed impracticable; and to your Grace's example and individual exertion this country is largely indebted for its present prosperity.

Many happy families owe to you the comforts of a life well spent, in honest, peaceful, healthful, and industrious avocations; and many, very many, are furnished with the necessaries of life, on terms much more favorable than they ever would have been, if your Grace had never been born.

My pen is very incapable, and what pen is able to set forth the great good your Grace has done? The mere abridgment of the labour of horses, (subject

as those generous animals are to the most horrid abuses; under the rigorous lash of many unfeeling wretches, to whose care they are entrusted) places you among the best of men; whilst your stupendous and magnificent works will ever rank you among the greatest ornaments of human nature.

It is scarcely possible to contemplate such subjects as are treated of in the following pages, without an irresistible impulse of gratitude for the beneficial effects your Grace's superior genius and perseverance have achieved, in pursuits of a similar nature.

An humble emulation of so illustrious an example begets the solicitude I feel to be honored with a Patronage so distinguished, and on such an occasion so truly desirable.

That your Grace may long continue to enjoy the fruits of and the satisfaction arising from your happy labours, is the sincere prayer of

MY LORD DUKE,

Your Grace's much obliged

And most humble Servant,

London,
1799.

JOHN DUMBELL.

THE

COMMERCIAL AQUEDUCT.

JUST before the close of the last session of Parliament, and after it was determined to pass the Bill for building Docks at the Isle of Dogs, a very hasty and undigested Sketch of the following Plan was presented for inspection—It was honoured with a candid and encouraging reception; and, a few days after, a select Committee of the House of Commons was appointed to take into consideration such other Plans as might be brought forward for the further improvement of the port of London.

The Isle of Dogs Plan professing to provide accommodation for no more than *one fourth* part of the mercantile

concerns of the river Thames, added to the numerous objections made to every other Plan hitherto submitted, does more than invite, for it makes it the duty of every man whose ideas on the subject are countenanced by the approbation of those he has opportunities of consulting, to lay those ideas fully before the Public, to be adopted or rejected according to their merits.—The following suggestions are offered with deference to the conspicuous abilities of those who have presented other Plans, and with unfeigned respect for the judgment of those who are to pronounce on the subject. A candid investigation is all that is requested; and confirmed as the Author is, by the liberal course of all the proceedings hitherto had on this important subject, that those Plans will be preferred which are best entitled to a preference, he purposes to rest his hopes entirely on the merits of his production. If those merits do not entitle him to be called upon for further exertion, he has at present no intention whatever of volunteering a contest, or of cultivating that sort of interest, for the promotion of his Plan, which he shall be the first to admit it is unworthy of, if it does not sustain itself without.

This Plan proposes to embrace the great points of commercial convenience and public accommodation, by bringing

the shipping nearer to the City and Custom-house; by enabling vessels of the greatest burthen to pass above all the three bridges, or any of them, without lowering their masts; without altering or meddling with any one of the bridges; without injuring the London-bridge water-works, damaging any of the roads, or increasing the draught of horses.

For this purpose it is proposed—that a straight line of ground on the Surry side of the Thames be appropriated for erecting a COMMERCIAL AQUEDUCT, or Canal, to admit vessels of any required burthen.—East-India ships are as capable of partaking of this accommodation as vessels of any other size.—This line might commence at or near Greenland-dock, and terminate at Lambeth.

It would form the String of the Bow, if the Thames at this place may be compared to a bow—A line now covered in a great degree by miserable huts, old insignificant and untenanted buildings, and in some parts occupied as garden ground. On this line let an Aqueduct be raised, the bottom of which to be high enough to permit loaded carriages of the greatest height to pass freely under its arches, wherever it intersects any of the streets or roads (as under the gateway at Temple-bar). Its height

would have a manifest advantage, as it would admit of warehouses being erected under the Canal, or at its sides, thereby saving immense labour and trouble; as the merchandize, when unloaded from the vessel, instead of being *hoisted up*, would only require *lowering down*.

The vessel way into this Canal must be by means of locks, or those contrivances used as substitutes for locks.

Greenland-dock (or a new dock made like Greenland-dock) would form a bason for the ships to come in, by the tide, and from this bason other locks would bring the ships up to the required level.

At proper distances, one arm from this Aqueduct should enter the Thames between London and Blackfriars bridges, and another arm between Blackfriars and Westminster bridges, with suitable locks at each of those places, as well as at the extremities of the Aqueduct, which would open the Thames and its banks as a reservoir of wealth, shipping, and warehousing, from London-bridge to Battersea-bridge; and the superstructure of the Aqueduct itself would also be a dock for vessels, and an immense range of warehouses for goods of all descriptions. And

when the vessels in the Aqueduct were discharged, and had occasion to take in their next freight from the warehouses of the Aqueduct, or from the banks of the river, they might descend through the locks into the arms of the Aqueduct, or into the Thames, where they would also be reloaded, with a manifest advantage from the shore above them—So that this Plan obviously furnishes a most easy method of loading and unloading vessels.

In these two great and essential points of view (loading and unloading), it is particularly to be regarded, that by this method it is effected with very little labour and in a most expeditious manner.

A considerable part of this Aqueduct, and its warehouses, would be made on ground belonging to the city of London; and, as their rental would be increased hereby, it is presumed it would be thought only what is due to that distinguished body, to name this as one reason in favour of the measure.

Perhaps the main part of the Aqueduct ought to be made of sufficient width to hold three vessels in breadth, one to unload at each shore at the same time, and one to pass between them.

In the necessary article of coals, this metropolis would thus reap considerable advantage; as the arms or branches of the Aqueduct would enable vessels in that trade to be brought to any part of the river, even as high as Battersea; a circumstance which must tend to lessen the price, as it would be a means of abridging the labour attendant upon furnishing the inhabitants with coals; for by this means they would be brought from the place they were originally shipped at, within cartage of the place of consumption, avoiding all the trouble, waste, expence, and loss of time, of their being put into lighters; and once raising them, to the height they are now raised in the Pool, would be sufficient; whereby not only the expence, but the obvious disadvantage of lowering them into lighters, would be saved, the landing of them being proportionably facilitated as the height of the ship exceeds that of the lighter. The drudgery too, so well known by the name of coal-heaving, might be also saved by means of the machinery hereafter mentioned; a circumstance which must be very pleasing to the humane and merciful, as well as in its consequences highly beneficial to the lower classes of mankind, in furnishing them and the manufactories, &c. &c. from whence they are supplied with this indispensable requisite.

If any of the warehouses should take fire, nothing could be better placed as a reservoir, to extinguish the flames,

than the Aqueduct itself; and the party-walls between each warehouse, would at the same time form effectual butments for the support of the structure.

In short, whatever the other Plans have offered relative to safety from fire, or from the common enemy, or from drepredations and smuggling, it is presumed this Plan embraces; for the locks would act as barriers, through which nothing could pass without permission.

In erecting this work, every brick would be of double value; First, as forming a Canal, and secondly, as forming the most convenient warehouses ever constructed.

In estimating the expence of the undertaking, it is not to be lost sight of, that it would be all above ground; of course no combating with uncertain foundations, springs, or tides; and the materials which would be used in forming other docks, would be the roofs of these warehouses; and such parts of the line as do not require that warehouses be erected, the Aqueduct might be supported by raised earth; as is done where the Duke of Bridgewater's Canal passes through Lord Stamford's grounds at Dunham.

Nil desperandum is a maxim verified in the present age. Let every one view with gratitude the wisdom displayed in the present aupsicious reign, by the encouragement bestowed on commerce, arts, and manufactures. Let him who doubts the weight which arches will bear, go to the building erected for the encouragement of arts, and survey the whole of that grand pile, the Adelphi. And when Canals are mentioned, let every one bring to mind the great works of the Duke of Bridgewater, which have since been followed by similar undertakings all over the kingdom.

Whoever have seen them cannot doubt of the practicability of the measure now proposed. His great mind has conceived, and his persevering genius has perfected, what before his day were thought impossibilities. He has shewn us that neither hills, nor vallies, nor navigable rivers, are to set bounds to human labour. The Aqueduct, at present recommended, has no such impediments as the noble Duke has conquered.

To compare small things with great ones, a street here, is as much as a navigable river in his undertakings; and a hackney coach in the Borough a vessel in full sail upon the river Irwell, where it passes under his Canal.

The nature of the Plan proposed, is such as to admit of various ways of providing for the expence of it; but as by this arrangement the bonding system would be made perfect, Government might take the affair wholly into its own hands. A fund might be opened, and the Subscribers to that fund insured four per cent. per annum; giving them a certainty of four per cent. with a chance of its being made from four to eight, provided the concern yields it; all profits above eight per cent. becoming the property of the State. And this great national work might be wholly managed by Administration, in the nature of the Post-office, Custom-house, &c. &c.

But it is worthy of consideration where to fix the maximum of the Subscribers profits, for if, instead of eight per cent. they were extended to ten or twenty per cent. a *bonus* (greater or less) might be *originally* given for a share; which would have a great effect, provided such *bonus*, with the extra profits, were laid out from time to time in the public funds, and there kept sacred, until they were adequate to pay off the principal originally advanced: when that day arrived, the Subscribers might be obliged (by a stipulating clause to be now inserted) to receive back their original deposits; and

this most valuable estate would then belong to the public revenue, and be unincumbered.

Administration might by this means raise any given sum; for individuals would readily treat, because Government would be liable for the security of four per cent. interest, and the concern itself would be a security for the principal; and it would be but right, if Government should take upon itself the sole controul and management, that, in return, it should gurantee to the Subscribers the four per cent. interest before mentioned.

One vast advantage resulting from this Plan is, that the river above London-bridge would hereby be opened to all the advantages that it is below London-bridge; for at high tide a collier or other vessel would get to the place of its destination, where it would remain till it was unloaded, and then by another tide return to the Aqueduct; and thus this great desideratum would be accomplished, without destroying the London-bridge water-works, or meddling with any of the bridges.

The facility with which the river may be excavated, if that should be necessary, by the powerful means now at

command, and herein after alluded to, makes it an easy task, not only to obtain a sufficient depth of water, but to remove other obstacles which may present themselves in qualifying both banks of the Thames, from London-bridge to Battersea, for the reception of all such barks as can contribute, by their nearer approach, to lower the expences of necessary articles, and of coals in particular. Hence an extension of commercial business would spread all along the margins of the river, which such a removal of existing obstacles would rapidly pave the way for. The great seat of commerce too would thus be kept much nearer the centrical parts of London; and the metropolis of the British empire, hastening as it now is to be the emporium of the world, would become *rounded;* its most irregular and unsightly parts would be made to correspond with the at present more favoured situations; and the natural consequences of such a Plan would create improvements to a considerable extent in its vicinage, which would greatly augment the value of its estates, and every description of property attached to them.

The present unoccupied state of a considerable part of the ground on which this Aqueduct is proposed to be erected, is highly favorable to the undertaking. The growing value of land, in all directions round the metropolis, would in

the course of a few years, from this period, subject such a Plan to an enormous increase of expence; and perhaps no where more than in that particular part of the line which crosses St. George's Fields.

The rents of the warehouses, the lock-tolls, and numerous other profits of which it would be productive, would defray all its cost in a very moderate space of time, admit of reducing very low the quay dues, lock-tolls, &c. and yield, when completed, an immense revenue.

There are streams on the Surry side of the Thames capable of supplying the necessary quantity of water, without injuring the interests of individuals in any respect; or the Thames itself might be resorted to, by taking a supply of water from thence from any of the higher levels; and by means of a subterraneous passage, from wherever the level would be found high enough, it might be easily made to answer the purpose; and the evaporation would be less by a subterraneous conveyance than by the present circuitous track of the Thames. The locks being properly constructed, and the Aqueduct once filled, it could not require much water for the performance of its office.

The vaults formed by the arches which are to support the Aqueduct, as well as the spaces between the butment walls on each side, will afford a very considerable quantity of warehouse room; in addition to which, warehouses, having their foundation on the buttresses, may be carried to any requisite height above the level of the quays.

The Roman Aqueducts, greatly inferior in all respects, served only to convey water to the city; whereas this design combines a variety of solid and national advantages, that would rank it among the proudest productions of this or any other age; whilst the grand effect of such a line of shipping as would be elevated on the Aqueduct so much above the surface of the earth, and crossing the road by which foreigners approach our capital, is admirably well calculated to impress them with a just conception of the extent to which British commerce has been carried, by the genius, the enterprize, and the resources of this wonderful country.

It is highly favourable to such undertakings as this, that the enormous expence of the methods *at present* in use for driving piles, raising water, sinking foundations, and many other important purposes essential to such works, will in future

be greatly diminished by means of the inestimable discovery of a power which is distinguished by the name of the PANERGICON. Its merits are not yet fairly before the public; but its importance may be in some degree estimated by the following description, which is copied verbatum from a concise explanation issuing from the PANERGICON OFFICE, opposite the North-Gate of the Royal Exchange.

" The PANERGICON* is capable of being applied to " all the uses of the Steam Engine, with a degree of benefit, " saving, and advantage, never yet experienced. It combines " all the best properties of steam, without requiring so cum- " brous an engine to give it effect, or so heavy an expence in " fuel to produce its operation. It is a *portable* power, easily " removed from place to place, requiring no coals to create its " force, no water to condense, no brick-work, and no boiler. " Its machinery consists principally of one cylinder, with a piston, " the bottom of which being kept hot, and the spirits of a very " cheap inflammable liquid being thrown upon it, a vapour is " thereby created, containing an elastic spring which has the " impelling force of gunpowder, without any of its dangerous

* Πανεργικον from παν (every thing), and εργικον a derivative of εργον a work, to denote the universal effects which the power in question is capable of producing.

" qualities. The action of this force raises the piston in the
" cylinder, and leaving a partial vacuum behind it, a perpendi-
" cular motion up and down is obtained; which, operating on
" suitable machinery, may be made to produce, in a simple, easy,
" and not expensive manner, all the good effects, and accom-
" plish all the weighty ends, which hitherto no combination of
" mechanism and power has been made to produce, without a
" variety of drawbacks on its utility, which this discovery is
" perfectly free from. Ten drops of this liquid is a proper pro-
" portion for a cylinder of a cubic foot; eighty drops will raise
" eight hundred weight twenty-two inches; and any other power
" may be gained by proportionably increasing the size of the
" cylinder, and augmenting the quantity of the liquid. A stock
" of this liquid is kept at the Patentee's Office, where it may be
" had, genuine and unadulterated, at eighteen-pence per gallon.

" The PANERGICON in the first cost of necessary apparatus,
" in the daily expence of working, and in keeping in constant re-
" pair, has great and obvious advantages over every invention that
" has been brought forward for similar purposes, independent of
" the saving of that valuable time which these repairs generally
" cost, to the injurious interruption of the works. It does not
" require delicate or nice machinery, the commonest blacksmith
" being competent to repair it; but it is obvious that repairs can

" very seldom be requisite, from the simplicity of the machinery.
" It is very applicable to the driving of piles, draining of grounds,
" foundations, coal-pits, mines (particularly those in Cornwall,
" where coals are scarce), and, being a portable power, is easily
" applied to wheel-carriages, sledges, heavy artillery, and other
" implements of war. It may be used to great advantage in the
" engines on the Thames for extinguishing fires; in the West-
" Indies it will be of the greatest value; and, on account of the
" small space it occupies, may be used on board ship in punt-
" ing, navigating, and *pumping* vessels. On shore it may super-
" sede the use of horse-mills, wind-mills, and the numerous
" engines now employed on heavy works under disadvantages of
" which this power does not partake. In oil-mills, presses of all
" descriptions, in discharging of all kinds of vessels, and parti-
" cularly in coal-heaving, it has the most decided advantages.
" Ship-builders in removing heavy timbers, anchor and copper
" smiths, and every description of mechanics who have occasion
" to deal with or remove heavy weights, will derive from this
" resource an invaluable aid:—To which end arrangements are
" now preparing for exhibiting specimens, and finally establish-
" ing the concern on a plan capable of putting the public in full
" possession of its powers, and of bringing them into universal
" exercise; but that as little impediment as possible may occur

" in the mean time, further explanations may be had at the " Office, opposite the North gate of the Royal Exchange; where " orders, and any other commands for the Proprietor and " Patentee, will be duly attended to.

" No less than twenty years are said to have elapsed " between the completion and the general use of that most " valuable instrument, Hadley's quadrant; Messrs. Bolton and " Watt's steam-engine was also so long in bringing into notice, " that in the preamble of the Act of Parliament to extend their " exclusive right beyond the length of their original patent, " that very considerable loss of time which they experienced, " was urged and admitted as a fit reason to grant them an " extension of twenty-one years; and many more instances of " the difficulty of bringing the most important discoveries into " use, and the delay to which they are subject, even after their " merits have been ascertained, might be brought forward. " The PANERGICON has likewise experienced them; but those " difficulties, and that delay, are now got over, and the eagerness " that is now manifested to call it into universal practice is more " than equal to the most sanguine expectations. Its advantages " will not be limited to this country only, for orders are " executing for MILLS to be sent to the West-Indies; but it is

" believed that it is not in its applicability to mills only that its " utility will be experienced in the Plantations, where the emo- " luments of the Proprietor, and the unquestionable advantages " it will yield to the Planters, must be deemed very inferior " objects when compared with its probable effects in ameliorating " the condition of slaves, and diminishing the necessity which " is urged for violating the rights of humanity." &c. &c.

The local situation of the Isle of Dogs is said to threaten alarming inconvenience and interruption to the progress of the great work about to be carried on there. It is asserted, that its being embanked from the tides, protects it only from a lesser evil, whilst a greater awaits it in the rising of springs, which may be looked for the moment the earth is excavated to a depth which will make it unable to counteract the pressure of the water in the river. On this subject, Lord Verulam, in the first century of his Natural History, informs us, that if a pit be dug upon the sea shore, somewhat above high-water mark, and sunk as deep as low-water mark, when the tide comes in it will fill with water fresh and potable; that this is commonly practised on the coast of Barbary, where there is a scarcity of fresh water; and that Cæsar availed himself of it (when the enemy had turned the sea-water upon the wells of

Alexandria), by directing pits to be dug on the sea shore, whereby he saved his army. But Cæsar mistook the cause, for he thought all sea sands had natural springs of fresh water. It is plain, however, that it is the sea water which flows into such pits, because they fill according to the measure of the tides; and the sea water passing, straining, or filtering, through the sand, leaves its saltness. An experiment was made to prove this; when it was found that water passed through ten vessels filled with earth does not lose its saltness, but when drained through twenty vessels it becomes fresh; and it is well worthy of notice, that in this experiment the water descended, but into the pits on the sea shore the water ascends, whereby it is more apt to lose its saltness, for the salter part of the water is most disposed to go to or remain at the bottom. If from causes similar to those Lord Verulam has so clearly defined as acting on the sea shore, the dreaded annoyance should occur to the obstruction of the work at the Isle of Dogs, the force of the discouraging effect it might otherwise produce may be materially diminished, by contemplating the facility with which the mischief may be overcome by the simple, cheap, and powerful means now presenting itself in the PANERGICON.

A dread of the consequences of inundation is said to

be entertained by the subscribers to the Gravesend tunnel, for which an act of parliament is also obtained; and the expence it might occasion, if the PANERGICON did not present its effectual powers, might indeed make it a reasonable cause for hesitation; but there surely will not be a want of enterprize to persevere in the design, now it is known that by its means the evil may not only be averted, but, by a judicious application of the water, it may, when drawn off, be converted into a source of profit. The accomplishment of this work is highly desirable for one important reason that seems to have escaped general observation, namely, that it would in all probability lead to the opening an uncircuitous road from London to Dover on the Essex side of the river, that would be free from the objections made to the hills so much complained of on the Kentish side.

It may be matter of surprise to some that the PANERGICON should not have been brought to light before the close of this century, but those who have made the greatest inquiry into the works of nature will be least surprised to find that so simple and efficacious a power has so long lain dormant, for they will readily admit the field of discovery is far from being exhausted—and those less versed in her works may suppose to themselves what their sensations would be if they were

unacquainted with the force of guns. If their effects, says Lord Bacon,* were to be described to a person ignorant of them, it would be difficult for him to conceive that their immense force is owing to a peculiar substance, as we experience in gunpowder. In the same manner, if a stranger to the original of silk were shewn a garment made of it, he would be very far from imagining so strong a substance to be spun out of the bowels of a small worm, but must certainly believe it either a vegetable substance, like flax or cotton, or the natural covering of some animal, as wool is of sheep. Or had we been told, before the invention of the magnetic needle among us, that another people was in possession of a certain contrivance by which they were enabled to discover the position of the heavens with vastly more ease than we could do, what could have been imagined more than that they were provided with some fitter astronomical instrument for this purpose? That any stone should have so amazing a property, as we find in the magnet, must have been the remotest from our thoughts. In like manner, then, let this great discovery (for perhaps a greater has not been made since the days of Sir Isaac Newton) be investigated with candour and attention—let it excite happier industry to set forth its real

* Vide Dr. Pemberton's View of Sir Isaac Newton's Philosophy.

merits—and, whilst it is a means of displaying, in a new instance, the bounty of the Creator, let it call forth reverence and gratitude from all those who are able to contemplate upon his works, his unbounded power, and consummate wisdom!

FINIS.